NASA GODDARD SPACE FLIGHT CENTER
TECHNOLOGY INFUSION
GMSEC
GSFC Mission Services Evolution Center

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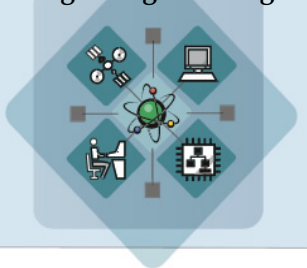
GMSEC Headlines

The GSFC Mission Services Evolution Center (GMSEC) is a coordinated effort across multiple NASA GSFC development organizations to provide data systems and services to NASA's Earth and Space Science Enterprise missions. Key to the GMSEC concept is its reference architecture designed to reduce system integration costs, increase system capability, and simplify technology infusion over time.

COTS and GOTS

COTS are commercial-off-the-shelf products that require the procurement of licenses and yearly maintenance fees. With GOTS (government-off-the-shelf) products, the government funds the development work and the sustaining engineering efforts, but license and yearly maintenance fees are not required.

GMSEC "Headlines" are prepared monthly to highlight a key GMSEC accomplishment or area of progress and interest. Current and past issues of Headlines are available on-line at **gmsec.gsfc.nasa.gov**.



COTS Vendors Supporting GSFC Ground System Efforts

COTS Options Important to GMSEC Approach

Most major development efforts utilize COTS packages to save time and money and to allow the system developers to concentrate on the special niche software and integration efforts specific to their unique system. By comparing COTS and internal product offerings, the system developer can balance cost, functionality, and compatibility and select the most appropriate tools.

GMSEC's reference architecture expands upon this approach with standardized interfaces to allow any of several competing products to be used or even to co-exist in a given installation. The more compatible products – the better. Final product decisions are made by the end-users (missions) and not by the GMSEC development team. This is a key aspect of GMSEC and it requires new relationships with COTS vendors, i.e., establishing partnerships.

Vendors have provided GMSEC with product interface documentation in support of the GMSEC message definition effort. We can work on pricing plans and can help integrate products into the GMSEC lab for demonstrations, but GMSEC can not guarantee any sales.

What's in it for the COTS vendors? GMSEC-compliant components can easily be integrated into GSFC systems. In some cases, this provides first-time opportunities for vendors to show their products' functionality in a realistic GSFC environment. With simplified integration and technology infusion, opportunities exist to introduce new products to both new and existing missions. Should the GMSEC approach be followed by other NASA centers or other parts of the aerospace industry, then the vendors will have helped create standards with broad applicability which reduce the number of variations needed for their own products.

L-3 Proves Ease of COTS Integration

L-3 Communications Storm Control Systems successfully integrated its COTS command and control system, InControl-NG into the GMSEC lab on July 22. Mr. Mike Bracken, L-3's Program Manager noted that "due to the ease of use of the GMSEC API and the open architecture of InControl-NG, the installation and integration was quick and seamless.

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Within minutes of first installing InControl-NG in the GMSEC lab, event messages began appearing on the GMSEC bus and were successfully processed by other applications subscribing to the published messages."

GMSEC's information bus approach means that new software components no longer need to integrate with every other component – they only need to interface to the bus per defined message standards. The L-3 system can support multiple satellites and is one of several COTS and GOTS telemetry and command systems being adapted to the GMSEC architecture.

AI Solutions Develops GMSEC Components; Sees Value of New Architecture

Product vendor and engineering contractor AI Solutions is working with GSFC civil servants to develop the AutoFDS flight dynamics product generation and delivery system which utilizes tools form AI Solutions' FreeFlyer suite of products. Asked to comment on the GMSEC project, Robert Sperling, AI Solutions' President, provided the following observation:

"GMSEC offers the potential to significantly reduce integration costs and ground system complexity. By providing a standard interface for mission ground systems, it will enable vendors such as AI Solutions to develop one interface instead of the typical four to five interfaces that had to be added to our mission application, FreeFlyer."

TIBCO
The Power of Now®

TIBCO Developing GMSEC Middleware Licensing Strategy

TIBCO, a leading provider of middleware messaging products, including TIBCO Rendezvous and TIBCO SmartSockets, is working with GMSEC to develop a licensing and costing approach matched to GMSEC's needs. The middleware for GMSEC has some of the attributes of an embedded product (SmartSockets is already embedded in Raytheon's Eclipse system) and other attributes more similar to traditional system developments and distributed systems. The agreement should be in place within the next several months and be available for both government and contractor procurements.

AGI

President of Analytical Graphics Discusses GMSEC

Paul Graziani, the President of Analytical Graphics, came to GSFC on July 30 for a presentation on the GMSEC architecture and to discuss AGI's support at GSFC. Analytical Graphics markets the Satellite Toolkit suite of tools.

Tom Stengle from GSFC's Mission Engineering and Systems Analysis Division is working with AGI on consolidating the licenses for the many AGI products in use at GSFC. GSFC makes extensive use of Satellite Toolkit for flight dynamics mission support.

AGI expressed great interest in becoming a participant in the GMSEC reference architecture and interface standardization effort. Follow up meetings have already been planned with their engineers to discuss how their products can be adapted to GMSEC. Mr. Graziani had the following comment about GMSEC: "AGI is excited about the progressive software methodologies the GMSEC program is bringing to the space operations community. This effort will promote reusability of GOTS and COTS software to dramatically increase efficiency. We are proud Satellite Tool Kit is a part of this effort."

Raytheon
ECLIPSE™

Raytheon's Eclipse is GSFC's Most Widely Used COTS Telemetry and Command System

Raytheon has supported the GMSEC message definition effort and GMSEC and Raytheon have begun meetings regarding adapting the Eclipse product to the GMSEC architecture. By combining Eclipse and GMSEC, missions will have all the key features they are accustomed to with Eclipse and will be able to take advantage of the new automation and advanced tool capabilities of the other GMSEC-compliant components.

GMSEC Uses Variety of Other Products

Specific COTS vendors discussed in this issue of Headlines are shown as examples of GMSEC's close interaction with aerospace product vendors. Many other general purpose products, including scripting languages, data analysis packages, operating systems, etc. are also used.